

Serial Number 10/747,647

Amendment

Response

Applicants attach an amended drawing for Figure 6 and a new drawing for Figure 7.

Objections to Specification

The examiner objects to the following wording in the specification - the sentence bridging the last line of page 6 to the fourth line of page 7 uses the term "quintiary" reflector, but Figure 4 does not show such a reflector.

Response

Applicants have submitted a new drawing (Figure 7) that shows the quintiary reflector (34) and the quaternary reflector (60).

The examiner has also objected to the subject matter in Claim 14, specifically a second linear receiver disposed in a conductive relationship with the non-convex side of the secondary reflector.

Applicants have amended Claim 14 to more particularly refer to a linear pre-heating receiver. Such a receiver (80), and its relationship to the linear receiver (40), is described at page 7, first paragraph, and is shown in Figure 7.

Objection to Claim

The examiner has objected to Claim 18 because a parabolic configuration is not a further limitation of a circular arcuate configuration.

Serial Number 10/747,647

Amendment

Response

Applicants have cancelled Claims 2 and 18 that are in independent form.

Indefiniteness Rejection

Claims 3, 16, 18, and 19 have been rejected under 35 USC 112, second paragraph as being indefinite for failing to point out and distinctly claim the subject matter applicant regards as the invention.

As amended, Claims 3 and 19 refer to a "reflector". Applicants thank the Examiner for this helpful suggestion.

As amended, Claim 16 depends from Claim 15, not non-existent Claim 65. Applicants thank the examiner for pointing out this deficiency.

Claims 2 and 18 have been cancelled.

First Anticipation Rejection

Claims 1 to 4, 6 to 10, and 15 to 20 have been rejected under 35 USC 102(b) as being anticipated by US 4,313,024, to Horne.

The examiner states that Horne teaches a primary reflector (32), secondary reflector (34) and a tertiary reflector (44) as claimed. The examiner contends that the focal zone of the third reflector at the black body (38) is in the volume defined by the tertiary reflector (44). The examiner believes that the present language encompasses light being directed to the tertiary reflector (44), but actually striking the black body before reflecting off the third reflector.

Serial Number 10/747,647

*Amendment*Response

Applicants have carefully read Horne and the amended claims. Horne does not show or describe the tertiary reflector (46) having a non-imaging configuration. Without such a configuration, Horne can't concentrate the light in the third focal zone in a manner that forms an axial cylindrical shape (for a trough concentrator) or a point shape (for a dish concentrator). Thus, Horne doesn't anticipate the present invention as set forth in remaining Claims 1, 3 to 4, 6 to 10, 15 to 17, 19, and 20 if Horne can't achieve the claimed structure and function of the present concentrators.

Also, Horne does not show or describe the tertiary reflector being within the focal zone of the secondary reflector (34). In fact, Horne requires the use of the black body (38) in the secondary reflector focal zone in order for the tertiary reflector to work at all, an element missing from the present invention. In other words, the tertiary reflector is not coupled to receive light energy in a concentrating manner from the secondary reflector. Thus Horne can't anticipate the present invention where Horne requires the use of an element not found in the present invention.

In addition with respect to Claim 9, Horne does not show the use of a light energy collection receiver being placed within the light concentrating area of the third focal zone. Thus, Horne does not anticipate the present invention in Claim 9.

Second Anticipation Rejection

Claims 1 to 4, 6 to 10, and 15 to 20 have been rejected under 35 USC 102(b) as being anticipated by US 4,131,485 to Meinel *et alia*.

The examiner states that Meinel teaches a primary reflector (2), a secondary reflector (4) and a tertiary reflector (6) as claimed. The examiner contends that the focal zone of the third

*Serial Number 10/747,647**Amendment*

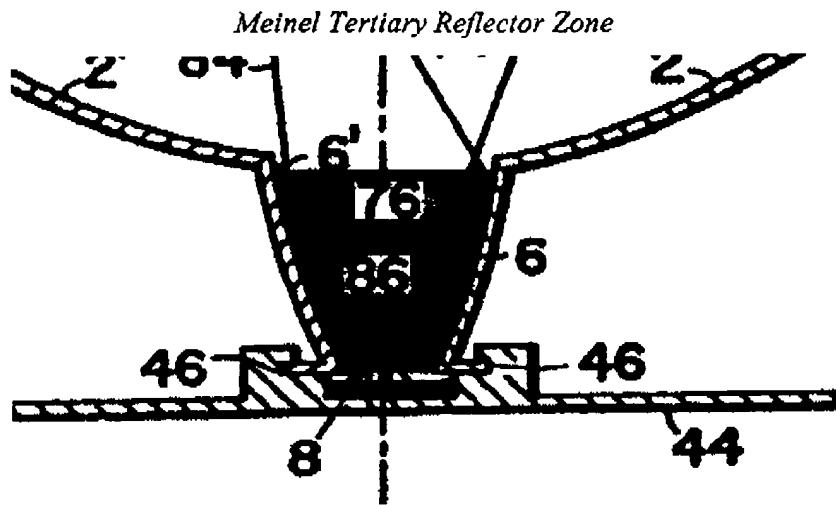
reflector is in the volume defined by that reflector (allegedly most clearly shown in Figure 4 where receiver (8) is within such a volume).

Response

Applicants have carefully read Meinel and the amended claims. Meinel does not show or describe the tertiary reflector (46) having a non-imaging configuration. Without such a configuration, Meinel can't concentrate the light in the third focal zone in a manner that forms an axial cylindrical shape (for a trough concentrator) or a spherical shape (for a dish concentrator). In fact, the receiver (8) has a planar shape because the tertiary reflector (6) isn't non-imaging (as most clearly seen in Figure 3). Thus Meinel doesn't anticipate the present invention as set forth in remaining Claims 1, 3 to 4, 6 to 10, 15 to 17, 19, and 20 if Meinel can't achieve the claimed structure and function of the present concentrators.

Also, Applicants cannot agree that Meinel shows or describes the receiver (8) being within the focal zone defined by the volume of the Meinel tertiary reflector. In fact, Meinel requires that the receiver (8) be placed outside the volume of the tertiary reflector. The tertiary reflector zone is illustrated by the figure below (the upper shaded portion surrounding numbers 76 and 86, shown in red). The top plane of the receiver (the lower shaded portion indicating receiver 8, shown in blue) is spaced apart from the line forming the bottom of the tertiary reflector volume. The receiver is not within that volume (shown as red). The focal zone is not within the volume of the tertiary reflector zone. Meinel would not have positioned the receiver where they did if it was not positioned at the focal zone for the tertiary reflector, an area clearly not within the volume of the tertiary reflector. Thus, Meinel can't anticipate the present invention when it requires the use of an element not found in the present invention.

Serial Number 10/747,647

Amendment

A closer inspection of Meinel shows that the concentrator does not function in the manner of the present invention. Reflector 40 in the present invention isn't designed to capture just some errant rays. The energy concentrated by the primary reflector is concentrated and directed to the secondary reflector, which in turn further concentrates and directs the energy to the tertiary reflector, which in turn further concentrates and directs the light energy into the third reflector focal zone. Thus, the claimed present invention provides an intense concentration of light energy, unlike Meinel.

In addition with respect to Claim 9, Meinel does not show the use of a light energy collection receiver being placed within the light concentrating area of the third focal zone. Thus, Meinel does not anticipate the present invention in Claim 9.

First Obviousness Rejections

Claims 1 to 10 and 13 to 20 have been rejected under 35 USC 103(a) as being obvious in view of Horne combined with US 3,990,914 to Weinstein *et alia* and US 4,168,696 to Kelly.

Serial Number 10/747,647

Amendment

The examiner states that Horne does not specifically teach having the concave side of the secondary reflector (34) being reflective and defining a fourth focal zone. However, the examiner states that Figure 1 of Weinstein and Figure 6 of Kelly show the use of a reflective concave surface to direct light to a light receiver at the focal zone of the concave reflector.

The examiner proposes that the combination of references teaches making the concave side of Horne's secondary reflector (34) reflective to define a fourth focal zone.

Response

Claims 1, 3 to 4, 13, 14, 16, 17, 19, and 20 are not obvious in view of Horne combined with US 3,990,914 to Weinstein and US 4,168,696 to Kelly. The concentrators of Claims 1, 3 to 4, 13, 14, 16, 17, 19, and 20 do not cover a convex reflector (30) having a reflector on the non-convex (concave) side (34). Thus, these claims can't be obvious in view of the stated combination.

Claims 5 and 15 do have such a combination, in further combination with a Cassegrarian concentrator so as to form a fourth focal zone.

Claims 5 and 15 are not obvious in view of Horne combined with US 3,990,914 to Weinstein and US 4,168,696 to Kelly. The secondary Weinstein and Kelly references simply show a single concave reflector and a light energy receiver. There is no suggestion made in either reference as to why one would graft this concentrator combination onto the back side of a convex reflector concentrator. None of the references suggest having a concentrator with a double sided reflector and a fourth focal zone. Thus, Claims 5 and 15 are not obvious.

Serial Number 10/747,647

Amendment

Second Obviousness Rejection

Claims 1 to 4, 6 to 12, and 15 to 25 have been rejected under 35 USC 103(a) as being obvious in view of Horne combined with US 5,062,899 to Kruer.

The examiner states that Horne does not teach tracking diurnal movement, but Kruer does.

Response

Applicants agree that diurnal tracking is known in the art. However, only Claims 11 and 21 contain a limitation on diurnal tracking. Thus, Claims 1, 3 to 4, 6 to 10, 12, 15 to 17, 19, 20, and 22 to 25 are not obvious in view of this combination of references.

With respect to Claims 11 and 21, Applicants disagree that Horne discloses the combination of the presently claimed elements. Horne does not show or describe the tertiary reflector (46) having a non-imaging configuration. Without such a configuration, Horne can't concentrate the light in the third focal zone in a manner that forms an axial cylindrical shape (for a trough concentrator) or a spherical shape (for a dish concentrator).

Also, Horne does not show or describe the tertiary reflector being within the focal zone of the secondary reflector (34). In fact, Horne requires the use of the black body (38) in the secondary reflector focal zone in order for the tertiary reflector to work at all, an element missing from the present invention. In other words, the tertiary reflector is not coupled to receive light energy in a concentrating manner from the secondary reflector, but from a non-reflective element missing from the present claims. In fact, Horne teaches against a concentrating of light energy on the tertiary reflector. Horne's tertiary reflector is a reflector of re-emitted black body radiation that has a 360 degree focus. Thus, Claims 11 and 21 are not obvious from the Horne disclosure where Horne requires the use of an element not found in the present invention.

Serial Number 10/747,647

*Amendment*Third Obviousness Rejection

Claims 1 to 10 and 13 to 20 have been rejected under 35 USC 103(a) as being obvious in view of Meinel combined with US 3,990,914 to Weinstein and US 4,168,696 to Kelly.

The examiner states that Meinel does not specifically teach having the concave side of the secondary reflector (34) being reflective and defining a fourth focal zone. However, the examiner states that Figure 1 of Weinstein and Figure 6 of Kelly show the use of a reflective concave surface to direct light to a light receiver at the focal zone of the concave reflector.

The examiner proposes that the combination of references teaches making the concave side of Meinel's secondary reflector (4) reflective to define a fourth focal zone.

Response

Claims 1, 3 to 10, 13 to 17, and 19 to 20 are not obvious in view of Meinel combined with US 3,990,914 to Weinstein and US 4,168,696 to Kelly. The secondary Weinstein and Kelly references simply show a single concave reflector and a light energy receiver. The concentrators of Claims 1 to 4, 6 to 10, 13, 14, and 16 to 20 do not cover a convex reflector (30) having a reflector on the non-convex (concave) side (34).

Claims 5 and 15 do have such a combination, in further combination with a Cassegranian concentrator so as to form a fourth focal zone.

Claims 5 and 15 are not obvious in view of Meinel combined with US 3,990,914 to Weinstein and US 4,168,696 to Kelly. Again, the secondary Weinstein and Kelly references simply show a single concave reflector and a light energy receiver. There is no suggestion made in either reference as to why one would graft this concentrator combination onto the back side of

Serial Number 10/747,647

Amendment

a convex reflector concentrator. None of the references suggest having a concentrator with a double sided reflector and a fourth focal zone. Thus Claims 5 and 15 are not obvious.

Fourth Obviousness Rejection

Claims 1 to 4, 6 to 12, and 15 to 25 have been rejected under 35 USC 103(a) as being obvious in view of Meinel combined with Kruer.

The examiner states that Meinel does not teach tracking diurnal movement, but Kruer does.

Response

Applicants agree that diurnal tracking is known in the art. However, only Claims 11 and 21 contain a limitation on diurnal tracking. Thus, remaining Claims 1, 3 to 4, 6 to 10, 12, 15 to 17, 19, 20, and 22 to 25 are not obvious in view of this combination of references.

With respect to Claims 11 and 21, Applicants disagree that Meinel discloses the combination of the presently claimed elements. Meinel does not show or describe the tertiary reflector (46) having a non-imaging configuration. Without such a configuration, Meinel can't concentrate the light in the third focal zone in a manner that forms an axial cylindrical shape (for a trough concentrator) or a point shape (for a dish concentrator). In fact, the receiver (8) has a planar shape because the tertiary reflector (6) isn't non-imaging (as most clearly seen in Figure 3). Thus Meinel doesn't teach the present invention if it can't achieve the claimed structure and function of the present concentrators.

Also, Applicants cannot agree that Meinel shows or describes the tertiary reflector (6) being within the focal zone defined by the volume of the Meinel tertiary reflector. In fact, Meinel requires that the receiver (8) be placed outside the volume of the tertiary reflector. The

Serial Number 10/747,647

Amendment

tertiary reflector zone is illustrated in the above figure, as described previously. The top plane of the receiver (also in the above figure and as described previously) is spaced apart from the line forming the bottom of the tertiary reflector volume. The receiver is not within that volume. Thus, the focal zone is not within the volume of the tertiary reflector zone. Meinel would not have positioned the receiver where they did if it was not positioned at the focal zone for the tertiary reflector, an area clearly not within the volume of the tertiary reflector. Thus Meinel can't obviate the present invention when it requires the use of an element not found in the present invention.

Claims 11 and 21 are not obvious from the Meinel disclosure where Meinel use a focal structure that is different from the present invention.

Obviousness Double Patenting Rejection

The examiner has rejected Claims 1 to 25 on the ground of non-statutory obviousness double patenting in view of US 6,668,820.

Response

Applicants submit a terminal disclaimer with this Amendment, in accordance with 37 CFR 1.321. Thus, this rejection is overcome.

Summary

In summation, as amended, remaining Claims 1, 3 to 17, and 19 to 25 are neither anticipated nor obvious, and allowance is requested. Applicants note that the cancellation of any claim does not connote agreement with the Examiner as to the arguments presented by the Examiner.

Serial Number 10/747,647

Amendment

If the Examiner has any further questions or reservations regarding this Amendment, Applicants request that the Examiner call their attorney at 919.968.6306.

Respectfully Submitted:



Brian D. Voyce

Attorney for Applicants

#28917

Date: February 24, 2005

Serial Number 10/747,647

Amendment

CERTIFICATE OF MAILING AND FACSIMILE TRANSMISSION

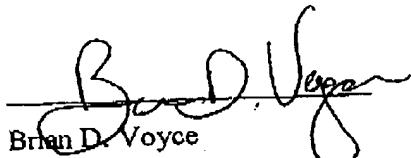
I, Brian D. Voyce, attorney for Applicants in a utility, non-provisional patent application entitled "*Multiple Reflector Concentrators and Systems*", Serial Number 10/747,647, filed December 29, 2003, hereby certifies and declares that the following documents attached hereto, have been sent by facsimile transmission to Art Unit 1753 care of telephone number 571-273-8300, as noted on the Office Action, and also have been deposited with the United States Postal Service, being addressed to the Commissioner for Patents, P. O. Box 1450, Alexandria, Virginia 22313-1450, having been affixed with proper postage for Express Mail delivery,

ER 696148356 US this 24th day of February 2006:

Amendment

Claim Listing

Drawings



Brian D. Voyce

Atty. No. 28917
8401 Sterling Bridge Road
Chapel Hill, NC 27516

- 14 -